

# MONTEREY COUNTY RESIDENTIAL AIR MONITORING

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R.J. Sava

December 1985

Reprinted December 1995

ENVIRONMENTAL HAZARDS ASSESSMENT PROGRAM

STATE OF CALIFORNIA  
Environmental Protection Agency  
Department of Pesticide Regulation  
Environmental Monitoring and Pest Management Branch  
1020 N Street, Sacramento, CA 95814-5624

EH 85-07

# MONTEREY COUNTY RESIDENTIAL AIR MONITORING

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R.J. Sava

Field Monitoring: R. Sava, D. Gonzales, C. Collison

Chemical Analysis: R. Maykoski

Graphics: D. Jones

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## **ABSTRACT**

Levels of pesticides were determined in ambient air collected at three residential locations within the vicinity of Salinas, California. Levels of all positive samples were in the nanogram per cubic meter range. Eight positive samples were collected during the period from midnight until 12:00 noon, coinciding with the time of the day when pesticides were applied to nearby fields, and wind speeds were lowest. One positive sample was collected from noon until midnight, the time of day coinciding with low pesticide application activity and higher wind speeds.

Based on the levels of residues found, there is no indication of a potential health hazard to individuals in the study area (See Risk Assessment Appendix A).

## **DISCLAIMER**

The mention of commercial products, their source or their use in connection with material reported herein is not to be construed as either an actual or implied endorsement of such product.

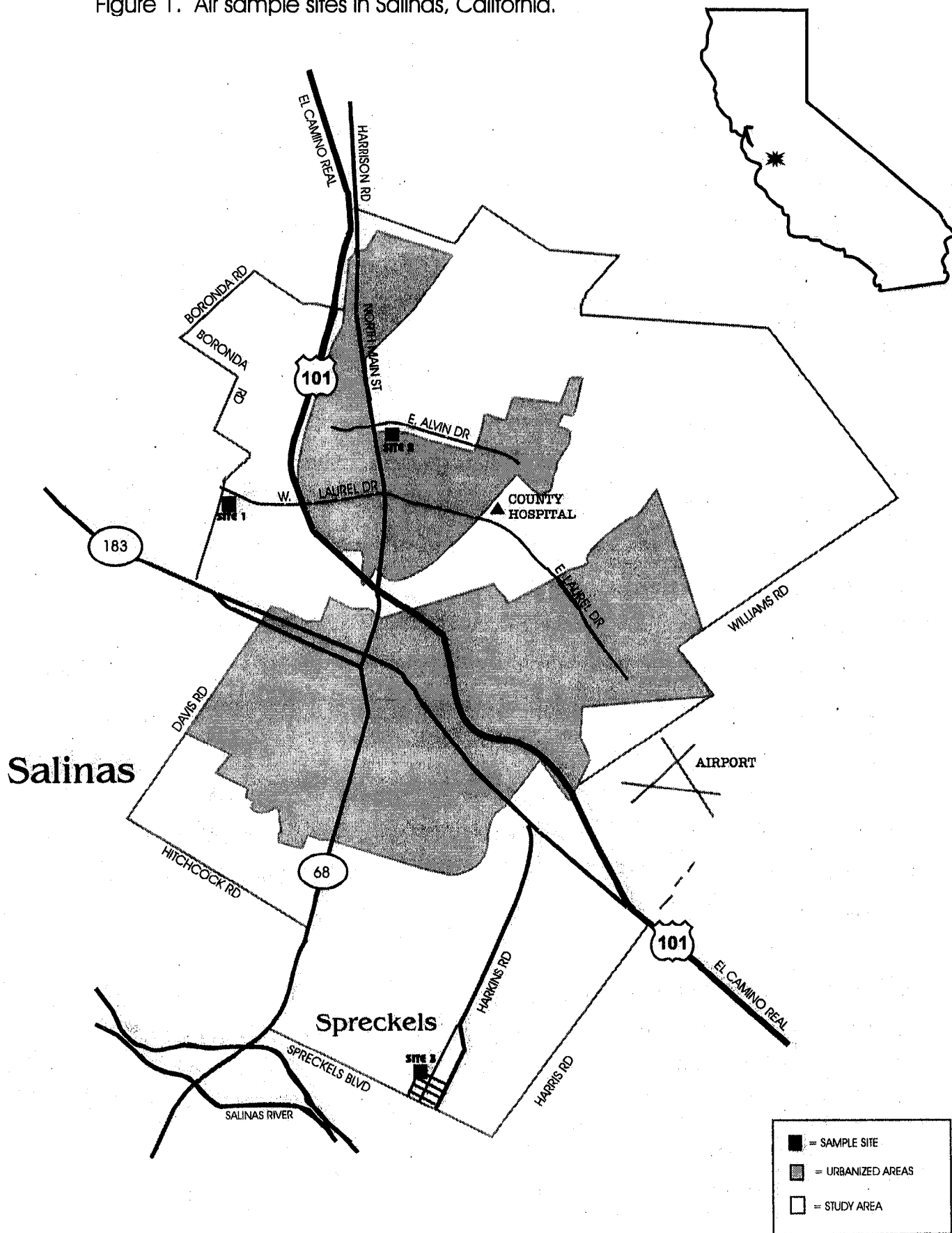
## **MONTEREY COUNTY RESIDENTIAL AIR MONITORING**

At the request of the Monterey County Agricultural Commissioner, Richard Nutter, the Environmental Hazards Assessment Program (EHAP) conducted a study to determine the levels of several agricultural chemicals present in ambient air collected at residential sites with close proximity to agricultural lands. The study was conducted during June, historically a high pesticide use month in the Salinas Valley.

Air samples were collected for six hour periods from noon on June 18 to noon on June 21, 1985, at three sites located at different areas around Salinas (Figure 1). Site No. 1, located on the west side of town, was a school located 1200 feet from agricultural fields. The predominant crop in this area was artichokes. Site No. 2 was a church and school located at the northern edge of Salinas and situated 190 feet from a fallow field. Site No. 3, located south of town in the Spreckles community was a private residence located 50 feet from a lettuce field. The three sites were located in areas where members of the Monterey County Agricultural Commissioner's staff had previously collected leaf samples and documented the presence of dacthal and endosulfan on these samples. No attempt was made to standardize site selection for comparative purposes nor was the study designed to coincide with any specific pesticide application. Pesticides were being applied in the immediate vicinity of Salinas during the three days that air samples were collected; most applications were made in the early morning hours. No attempt was made to identify exact application sites or times.

Air samples were collected simultaneously at three sites using low volume air samplers calibrated at 32 liters per minute. Each lo-vol was set up to draw air through two tubes packed with XAD-2 resin as sampling media, with the tubes mounted on a tee fitting and positioned parallel to the ground. One tube was to be analyzed for phosdrin, lannate, and screened for organophosphates. The second tube was analyzed for dacthal, endosulfan, and screened for chlorinated hydrocarbons. The first sample was initiated at 12:00 noon on 6/18/85 and run for

Figure 1. Air sample sites in Salinas, California.



six hours. At the end of the six hour sampling period, a new pair of tubes was mounted on each sampler. Consecutive six hour samples were taken for a total of 72 hours which produced 12 pairs of samples for each site.

Chemical analysis of all samples were performed by the California Department of Food and Agriculture, Chemistry Laboratory Services in Sacramento.

The analyses for the organophosphate screen and specifically for phosdrin and lannate were performed using a Varian 3700 gas chromatograph equipped with a thermionic specific detector. The analyses for the chlorinated hydrocarbon screen and specifically for dacthal and endosulfan were performed using a Hewlett Packard 5800 gas chromatograph equipped with an electron capture detector.

Analytical results for all samples are presented in Table 1. The percentages of recovery of pesticides from spiked samples and minimum detectable levels for all analyses are presented in Tables 2 and 3, respectively. Wind speed and direction data collected at Site 1 are presented in Table 4.

At Site 1, located east of and directly downwind from large artichoke fields, detectable levels of pesticides were found in five of the twelve samples. Three samples contained endosulfan, one ethyl parathion, and one sample contained both endosulfan and methyl parathion. All concentrations detected were in the nanogram per cubic meter range. At Site 2, located south of a fallow field and near an area in Salinas where artichokes are grown, two samples contained endosulfan in the nanogram per cubic meter range. At Site 3, located in the town of Spreckles and about 50 feet from a lettuce field, two samples contained phosdrin in the nanogram per cubic meter range. One positive sample was detected at Site 1 during the 1800 to 2400 hr sampling period, all other positive samples occurred during the 2400 hrs (midnight) to 0600 or 0600 to 1200 hr sampling periods. The lowest wind speeds were also reported during these same two sampling periods. Wind direction was consistently out of the northwest.

In conclusion, very low levels of pesticides were detected in air samples collected from residential sites during the morning hours of high application activity and during periods of lower wind speed. Almost no pesticides were detected by air samples during the afternoon hours of reduced application activity and higher wind speeds.

Table 1. Concentrations and pesticides detected in air. All values expressed in ug/m<sup>3</sup>. #

Date	Time Period	Detection Level SITE 1	Detection Level SITE 2	Detection Level SITE 3
6/18/85	1200 to 1800 hrs	N.D. ##	N.D.	N.D.
6/18/85	1800 to 2400 hrs	N.D.	N.D.	N.D.
6/19/85	2400 to 0600 hrs	.013 Ethyl Parathion	N.D.	N.D.
6/19/85	0600 to 1200 hrs	N.D.	N.D.	N.D.
6/19/85	1200 to 1800 hrs	N.D.	N.D.	N.D.
6/19/85	1800 to 2400 hrs	.051 Endosulfan 1, .017 Methyl Parathion	N.D.	N.D.
6/20/85	2400 to 0600 hrs	.042 Endosulfan 1	N.D.	.034 Phosdrin
6/20/85	0600 to 1200 hrs	.034 Endosulfan 1	N.D.	N.D.
6/20/85	1200 to 1800 hrs	N.D.	N.D.	N.D.
6/20/85	1800 to 2400 hrs	N.D.	N.D.	N.D.
6/21/85	2400 to 0600 hrs	N.D.	.035 Endosulfan 1	N.D.
6/21/85	0600 to 1200 hrs	.034 Endosulfan 1	.036 Endosulfan 1	.017 Phosdrin

# To convert ug/m<sup>3</sup> to Parts Per Trillion (PPT, WT:WT) multiply the value of each positive sample by 833.

## N.D. = None Detected, minimum detection levels and recovery rates on Tables 2 and 3.

Table 2. Recoveries and minimum detectable levels for selected organophosphate pesticides from lo-vol samples.

Compound	% Recovery ( 2 ug Spike )	Minimum Detectable Level for a 6 hr (16 L/min) Lo-Vol Sample (ug/m <sup>3</sup> )
Phosdrin	95%	0.010
Furadan	97%	0.024
Diazinon	97%	0.005
Lannate	98%	0.035
Methyl Parathion	96%	0.007
Dursban	99%	0.009
Ethyl Parathion	96%	0.017
Malathion	96%	0.017

Table 3. Recoveries and minimum detectable levels for selected chlorinated pesticides on lo-vol air samples.

Compound	% Recovery ( 2 ug Spike )	Minimum Detectable Level for a 6 hr (16 L/min) Lo-Vol Sample (ug/m <sup>3</sup> )
Dursban	99%	0.035
Dacthal	99%	0.017
Endosulfan (Thiodan I)	92%	0.009
ppDDE	97%	0.017
Endosulfan (Thiodan II)	95%	0.017
ppDDD	99%	0.017
Endosulfan (Thiodan S)	99%	0.052
Methoxychlor	99%	0.069
Tedion	99%	0.052

Table 4. Wind speed and direction. #

Date	Time Period	Avg. Wind Speed (MPH)	Avg. Wind Direction
6/18/85	1200 to 1800 hrs	10 #	315°##
6/18/85	1800 to 2400 hrs	7	305°
6/19/85	2400 to 0600 hrs	4	300°
6/19/85	0600 to 1200 hrs	5	275°
6/19/85	1200 to 1800 hrs	10	300°
6/19/85	1800 to 2400 hrs	6	315°
6/20/85	2400 to 0600 hrs	4	315°
6/20/85	0600 to 1200 hrs	4	210°
6/20/85	1200 to 1800 hrs	11	315°
6/20/85	1800 to 2400 hrs	8	325°
6/21/85	2400 to 0600 hrs	2	290°
6/21/85	0600 to 1200 hrs	5	330°

# Met 1 weather system was located at Site 1 for the duration of the study period.

## All values for average wind speed and average wind direction were calculated by averaging the six hourly readings. Readings are listed as degrees clockwise from due north (north= 360° or 0°, south= 180°).

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# Monterey County Residential

## Air Monitoring 12/85

### Risk Assessment

#### A. Results of Air Sampling

<u>Compound</u>	<u>Site</u>	Minimum Detection Level (ng/m <sup>3</sup> ) (recovery)	Detected Concen <sup>@</sup> (ng/m <sup>3</sup> )	Adjusted Concen-100% (ng/m <sup>3</sup> )
Ethyl parathion	#1	17 (96%)	13	14
Methyl parathion	#1	7 (96%)	17	18
Endosulfan	#1	9 (92%)	51	55
Endosulfan	#1	9 (92%)	42	47
Endosulfan	#1	9 (92%)	34	37
Endosulfan	#2	9 (92%)	35	38
Endosulfan	#2	9 (92%)	36	38
Phosdrin	#3	10 (95%)	34	36
Phosdrin	#3	10 (95%)	17	18

@ Collected over 6 hours.

#### B. Physiological Data

	Body Wt. (Kg)	Minute Volume (L/min)	
		<u>Resting</u>	<u>Light Work</u>
Man:	70	7.5	20.0
Woman:	50	6.0	19.0

#### C. Ethyl/Methyl Parathion

- Highest concentration detected (methyl) = 18ng/m<sup>3</sup>  
= 18pg/liter
- Resting minute volume = 7.5 liters/min (man)

3. Amount inhaled in 24 hours (resting)

$$\begin{aligned} & 18\text{pg/liter} \times 7.5 \frac{\text{liters}}{\text{min}} \times \frac{60\text{min}}{\text{hr}} \times \frac{24\text{hrs}}{\text{day}} \\ & = 194,400\text{pg/day} \\ & = 0.194\text{ug/day} \end{aligned}$$

4. Amount inhaled in 8 hours (light work):

$$\begin{aligned} & 18\text{pg/liter} \times 20 \frac{\text{liters}}{\text{min}} \times \frac{60\text{min}}{\text{hr}} \times \frac{8\text{hrs}}{\text{day}} \\ & = 172,800\text{pg/8hr.} \\ & = 0.172\text{ug/8 hours} \\ & = \end{aligned}$$

5. NOEL\* = 0.05 mg/kg/day Ref: Casarett & Doull

\* Based on cholinesterase inhibition

$$\begin{aligned} 70 \text{ kg} \times 0.05 \text{ mg/kg/day} &= 3.5 \text{ mg/day Maximum Permissible Intake (MPI)} \\ &= 3500\text{ug/day} \end{aligned}$$

$$\begin{aligned} \text{Margin of safety} &= \frac{3500\text{ug/day}}{0.194\text{ug/day}} = 18,041 \end{aligned}$$

6. Threshold Limit Value (TLV)<sup>a</sup> = 0.05 mg/m<sup>3</sup>  
= 10<sup>5</sup> ng/m<sup>3</sup>

$$\begin{aligned} \text{Margin of safety} &= \frac{10^5 \text{ ng/m}^3}{18 \text{ ng/m}^3} \left( \frac{8\text{hr.TLV}}{6\text{hr. sampling}} \right) = 5,555 \end{aligned}$$

D. Endosulfan

1. Highest concentration detected = 55 ng/m<sup>3</sup>  
= 55 pg/liter

2. Amount inhaled in 24 hours (resting) for woman:

$$\begin{aligned} 55\text{pg/liter} \times 6.0 \frac{\text{liters}}{\text{min}} \times \frac{60\text{min}}{\text{hr}} \times \frac{24\text{hours}}{\text{day}} &= 475,200\text{pg/day} \\ &= 0.475\text{ug/day} \end{aligned}$$

a Note: A margin of safety is already included in the TLV

3. Amount inhaled in 8 hours (light work) for woman:

$$55\text{pg/liter} \times 19 \frac{\text{liters}}{\text{min.}} \times 60 \frac{\text{min}}{\text{hr}} \times 8\text{hr} = 501,600\text{pg/8hr.}$$
$$= 0.501\text{ug/8hr}$$

4. NOEL = 0.7mg/kg/day \*

\* Based on rabbit teratology study Raltech Scientific Services  
#A-79-370 7/27/81 From EPA one liners #246792

For 50kg woman

$$50\text{kg} \times 0.7\text{mg/kg/day} = 35\text{mg/day} = \text{M.P.I.}$$
$$= 35000\text{ug/day}$$

$$\text{Margin of safety: } \frac{35,000\text{ug/day}}{0.475\text{ug/day}} = 73,684$$

5. TLV =  $0.1\text{mg/m}^3$   
=  $10^5\text{ng/m}^3$

$$\text{Margin of safety: } \frac{10^5\text{ng/m}^3}{55\text{ng/m}^3} \left( \begin{array}{l} \text{8 hours TLV} \\ \text{6 hours sampling} \end{array} \right) = 1,818$$

#### E. Phosdrin

1. Highest concentration detected =  $36\text{ng/m}^3$   
= 36pg/liter
2. Amount inhaled in 24hr. (resting) for man:  
 $36\text{pg/liter} \times 7.5 \frac{\text{liters}}{\text{min}} \times 60 \frac{\text{min}}{\text{hr.}} \times 24\text{hrs} = 388,800\text{pg/day}$   
= 0.388ug/day
3. Amount inhaled in 8 hours (light work) for man:  
 $36\text{pg/liter} \times 20 \frac{\text{liters}}{\text{min.}} \times 60 \frac{\text{min}}{\text{hr.}} \times 8\text{hr} = 345,600\text{pg/8hr.}$   
= 0.345ug/8hr

4. NOEL: 0.014 mg/kg/day \*

\* Based on red blood cell cholinesterase  
(man) Ref: Pesticides Studied in Man(Hayes)

For 70kg man:

$$70\text{kg} \times 0.014\text{mg/kg/day} = 0.98\text{mg/day} = \text{M.P.I.} \\ = 980\text{ug/day}$$

$$\text{Margin of safety: } \frac{980\text{ug/day}}{0.388\text{ug/day}} = 2,525$$

$$5. \text{ TLV} = 0.1\text{ng/m}^3 \text{ (8hours)} \\ = 10^5\text{ng/m}^3$$

$$\text{Margin of safety: } \frac{10^5\text{ng/m}^3 \text{ (8hr TLV)}}{36\text{ng/m}^3 \text{ (6 hour sampling)}} = 2,777$$

### Summary

<u>Compound</u>	<u>Margins of Safety</u>	
	<u>NOEL</u>	<u>TLV<sup>c</sup></u>
Parathion (methyl)	18,041 <sup>a</sup>	5,555
Endosulfan	73,684 <sup>b</sup>	1,818
Phosdrin	2,525 <sup>a</sup>	2,777

a Based on cholinesterase inhibition

b Based on maternal toxicity

c In addition to the safety factor built into the TLV